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Environment

Date:  
May 14, 2018

Subject:  
Semantic items follow-up from April 30, 2018 meeting

Contact:  
Shannon Ulrich

Dear Sai, Johanna, and Phil,

Phone:  
303 471 3465

Email:  
Shannon.Ulrich@arcadis.com

Thank you for meeting with us on April 30<sup>th</sup> to talk through the Grants Homestake Mill site split-sampling event (2016) data. We appreciate your willingness to present your work and to discuss some of our/your interpretations of the data. As established in the meeting, Arcadis has reviewed and analyzed the data in much the same ways as the United States Geological Survey (USGS) has done and has come to many of the same conclusions as the USGS. Nevertheless, we did have some concerns regarding the presentation of USGS' conclusions. These concerns are semantic in nature, where the use of certain terms or phrasing has the potential to affect readers' (in a publication) or viewers' (presentation) understanding of USGS' conclusions and may lead to readers' misinterpretation of the science.

Our ref:  
AO000120.1702

1. The terms "mine impacted waters", "mixed waters" and "impacted waters" were used to describe waters that were either affected by anthropogenic activities (mining or milling) or waters that have been naturally affected by the native presence of uranium bearing material or alluvial sediments deposited that contain natural particulate uranium ore material, or soil minerals that contain uranium. Additionally, the term "mixed waters" was used to describe water that has some mine impacts, water that has been affected by nuclear facility or radioactive

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deposits, or water that could be entirely natural in origin. The use of these terms to encompass both human-affected and natural conditions is misleading and could cause readers or viewers to erroneously assume that groundwater, with naturally-elevated constituents due to contact with uranium deposits are, in fact, contaminated by mining or milling activities. It is not accurate to use these terms interchangeably.

These semantic concerns can easily be remedied by only using the term “mine-impacted waters” to describe water that has been shown to be affected by active mining or milling activities. Terms such as “naturally affected waters” or “possibly affected waters” could be used to describe water that has signatures of naturally-elevated constituents and/or that has not been definitively shown to be affected by historical mining activities. This classification would include wells where doubt exists as to the origin of the water, especially where local geology has been shown to be enriched in constituents-related lithologies at depths that could not possibly have been deposited within the last few thousands of years (e.g., boreholes DD-BK and DD2-BK that show elevated uranium in the unsaturated soil, significantly above the water table, but below ground surface by 11-12 and 25-26 feet).

2. The term “verdict” is contentious and implies that the USGS has made a ruling on whether wells have been impacted by anthropogenic mining/milling effects or not. The USGS has been very clear that their role does not include the issuance of judgment or regulatory recommendations or rulings. The use of the term “verdict” contradicts this and implies that the USGS is taking an active stance that could be interpreted as a recommendation to regulatory agencies such as the EPA. Alternative vocabulary such as “conclusion” or “interpretation” would be more appropriate.
3. The U-235/U-238 ratio showed a slight enrichment in U-235 in select samples and this was classified as “affected by nuclear facilities or radioactive deposits”. However, it is unlikely that the mining or milling process used in the region could enrich U-235, so the statement about nuclear facilities is not accurate. The USGS summary chart will indicate that these “mixed waters” are “affected by nuclear facilities”. This will be misleading to readers.

We welcome discussion on these topics and hope that you found the meeting as informative and helpful as we did. It was great to review the science and our individual teams’ interpretation of data from the split sampling event. As we discussed at the outset, we see the two data sets as a valuable quality assurance component of this effort. In this vein, we are also looking forward to seeing the as-yet unreleased uranium and selenium micropurge and volumetric purge data and all of the passive sampler data (original and adjusted). This is a very interesting body of information and we’re all eager to be involved in developing the conceptual site model to better understand the natural and anthropogenic effects on the basin.

Sincerely,

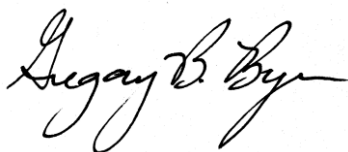
Arcadis U.S., Inc.

A handwritten signature in black ink, appearing to read "Shannon Ulrich".

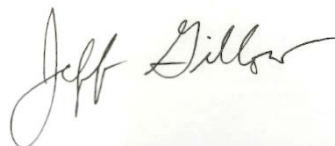
Shannon Ulrich  
Geochemist

A handwritten signature in black ink, appearing to read "Shawn Roberts".

Shawn Roberts  
Hydrogeologist

A handwritten signature in black ink, appearing to read "Greg Byer".

Greg Byer  
Geophysicist

A handwritten signature in black ink, appearing to read "Jeff Gillow".

Jeff Gillow  
Geochemist